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Constructs Underlying Word Selection and Assessments Tasks in the Archival Research on Vocabulary Instruction

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There has been an upsurge of interest in vocabulary research since it was identified as a pillar of the reading process in the National Reading Panel report (NICHD, 2000). Vocabulary instruction, in particular, seems to be a potentially rich area of exploration (Rand Reading Study Group, 2002). As literacy researchers explore vocabulary instruction in more depth, it is useful to examine the research and documents that create the foundation for what is known about vocabulary instruction. As the National Reading Panel report noted, research on vocabulary instruction is distressingly thin, particularly experimental or quasi-experimental studies (NICHD, 2000). In addition, understanding of the complexities of word learning has increased since many of the studies cited in reviews such as the National Reading Panel were conducted (Nagy & Scott, 2000).

This study examined three influential review papers on vocabulary instruction (Baumann, Kame'enui, & Ash, 2003; Blachowicz & Fisher, 2000; NICHD, 2000) in order to assess two elements of archival vocabulary research: (a) constructs underlying the selection of words in studies within the archival literature, and (b) constructs that underlie the assessment tasks of vocabulary learning in these studies. The criteria for word selection and for assessment tasks were analyzed to evaluate the degree to which selected archival studies reflect current understanding of important elements in vocabulary acquisition.

While there may be some argument regarding which elements of vocabulary acquisition are most important, there appears to be a growing consensus that word learning is complex and multifaceted. Studies of classroom instruction indicate that the most common type of vocabulary instruction consists of the teacher giving a brief definition and contextual information for a word and asking students to write sentences for given definitions (Scott, Jamieson-Noel, & Asselin, 2003; Watts, 1995). Several researchers have indicated that this practice is problematic for a variety of reasons, including the difficulty of accessing information from definitions (Scott & Nagy, 1997) and the cognitive and the metalinguistic demands of the task (McKeown, 1993; Miller & Gildea, 1987).

In an attempt to provide a deeper understanding of vocabulary acquisition, Nagy and Scott (2000) surveyed the research and developed a set of constructs that reflect the complexity of word learning. The five constructs identified by Nagy and Scott are *incrementality*, *multidimensionality*, *polysemy*, *interrelatedness*, and *heterogeneity*. These constructs explain distinct aspects of vocabulary processing as the following paragraphs demonstrate.

Incrementality describes the concept that knowing a word is a matter of degree and this knowledge can grow over time and exposure (Beck, Perfetti, & McKeown, 1982; Stahl, 2003).

Thus, word learning is not an "all or nothing" phenomenon for most words. People have varying degrees of knowledge about words, ranging from words they feel comfortable using in speech to words with a vague familiarity to words that are completely unknown.

The concept of *multidimensionality* relates to the idea that word knowledge consists of several qualitatively different types of knowledge. This knowledge may include nuances of meaning that distinguish between words such as *glimpse* and *glance*. Multidimensionality also includes understanding the ways in which words typically occur together (e.g., a *storm front* not a *storm back*) and the type of setting in which a word is typically found (e.g., academic or slang) (Schmitt, 1998).

Polysemy describes words that have multiple meanings. For example, the word *draft* has a number of distinct meanings, including *a current of air, being inducted into the military, the act of drawing from a container,* and *a first copy of a text.* Polysemy is important in teaching and assessing vocabulary, because words that are frequently found in texts that children read often have multiple meanings. Educators need to consider which words are known by students and also to determine whether the definition that students know is the one used in the current context.

Interrelatedness refers to the concept that a student's knowledge of any given word is *not* independent of his or her knowledge of other words (Landauer & Dumais, 1997). For instance, if a child knows the word *magma*, it is likely that he or she learned it within a context that also included the words *volcano* and *lava*. Furthermore, words share morphemes that can make the meaning across a group of morphologically related words transparent (Carlisle, 1995).

The concept of *heterogeneity* is particularly complex and entails the idea that what it means to know a word differs substantially depending on the qualities of a particular word and the way that the word is used in a text (Graves, 1987). The idea of heterogeneity can be deconstructed to include the following ideas: (a) words may be more or less conceptually complex (e.g., *president* vs. *government*), (b) more or less abstract (*cloud* vs. *illusion*) (Schwanenflugel, 1991), (c) more or less important for understanding a text (Diakidoy, 1998), (d) more or less frequently seen in English (Zeno, Ivens, Millard, & Duvvuri, 1995), and (e) have different syntactic features (Schwanenflugel, Stahl, & McFalls, 1997).

In short, many factors influence the effectiveness of instruction designed to improve vocabulary acquisition. Research results may depend as much on text factors and the complexity of word knowledge as on the instructional method that is the focus of the study.

Additional factors also influence outcomes in vocabulary research. The metalinguistic demands of word learning and individual students' metacognitive and metalinguistic skills affect vocabulary acquisition (Graves & Watts-Taffe, 2002). This ability to reflect on and manipulate structural features of language includes such tasks as the use of word knowledge to validate a statement, the transferability of vocabulary knowledge to other words, the use of metacognitive strategies to derive word meanings (Lubliner & Smetana, 2005), knowledge of how to use morphology to figure out word meanings (Anglin, 1993; Baumann, Edwards, Font, Tereshinski, Kame'enui, & Olejnik, 2002), and knowing how to use context clues to figure out meaning. As Nagy and Scott (2000) point out in their synthesis of vocabulary research, the constructs and metalinguistic demands of word learning listed above are critical factors in analyzing the demands that word learning tasks place on students.

In addition to the constructs based on a complex understanding of word learning, vocabulary research includes factors reflecting a simple understanding of what it means to know a word.

Included in the "simple understanding" category are factors such as "likely knownness" of a word (prior word knowledge) (Hiebert, 2005), accuracy in knowing specific words (choosing the correct synonym on a vocabulary test), and breadth of word knowledge (knowing the array of words tapped by a particular assessment).

Attention to the complexity and metalinguistic demands of vocabulary acquisition is relatively new (Graves & Watts-Taffe, 2002). However, many claims and instructional programs are being constructed based on research limited to a simple understanding of word learning; research that may not have taken complex concepts into consideration. The current study was designed to examine the archival research on vocabulary learning with the intent of determining the extent to which constructs reflecting a full understanding of the complexity of word learning have been incorporated in the studies on which we are basing current recommendations for policy and instruction.

METHOD

Selection of Studies

A selective sampling procedure of the available studies was used to identify word selection criteria and assessment tasks. The reason for a selective rather than an exhaustive sampling procedure was to ensure that no single or group of researchers' work was over-represented. By selectively sampling studies from the three reviews of the vocabulary instructional literature that were published from 2000-2003, a database that represented the most influential studies in vocabulary instructional research could be accessed.

The three reviews of research on vocabulary instruction that update earlier reviews such as Beck and McKeown's (1991) and Anderson and Nagy's (1991) were: (a) Blachowicz and Fisher's (2000) review in the 3rd volume of the *Handbook of Reading Research*; (b) Baumann, Kame'enui, and Ash's (2003) review in the 2nd edition of the *Handbook of Research on Teaching the English Language Arts*; and (c) *The National Reading Panel Report*, Chapter 4, Part 1: Vocabulary Instruction (NICHD, 2000). Studies from the reference lists of these three reviews were compiled into a master list. The first filter of this master list was to exclude any study that did not appear in at least two of the three reviews of literature. Next, reviews of literature or meta-analyses were removed from the studies that appeared two or more times in the three reviews.

The resulting database was then analyzed to identify every third study. The "third study" criterion was used because the same researcher or group of researchers using similar methodologies often conducted several related studies. The third-study criterion guarded against domination by prolific scholars who published several related studies and meant that the breadth of procedures for selecting words and assessment tasks could be established in the present study.

The application of the third-study criterion resulted in 17 studies. From this set of studies, one was eliminated because it reported a strategy for vocabulary instruction but contained no data. The 16 studies that were the focus of the analysis are listed in Appendix A.

Characteristics of the Sample Studies

Within the corpus of 16 studies, 11 were conducted with elementary age students. A review of the methods sections of the studies indicated that a majority of the subjects were from middle

class or upper-middle class homes. Only two reported that subjects were primarily from low socio-economic status backgrounds, including a high percentage of African American children. English language learners were not identified as subjects in any of the 16 studies.

The number of target words that were used for these vocabulary assessments varied widely, ranging from a high of 104 words to a low of 8 words. More than half of the studies included a reading comprehension assessment as a dependent measure in addition to measuring vocabulary acquisition. In addition, four of the studies had a relatively small number of participating students, approximately the size of one class, or fewer than 30 subjects.

Categorization Schemes

The first categorization scheme was aimed at classifying the 16 studies according to the instructional emphasis of the study. Five instructional foci were identified: vocabulary acquisition from read aloud, effects of vocabulary programs on reading comprehension, derivation of word meaning from context, effects of specific strategies on vocabulary acquisition, and acquisition of technical vocabulary. The instructional foci and the corresponding studies are listed in Table 1.

Table 1. Instructional Foci of Corpus of Studies

Instructional Focus	Study
Vocabulary Acquisition from Read-aloud	Eller, Pappas, & Brown (1988)
	Leung (1992)
	Stahl, Richek, & Vandevier (1991)
	Nicholson & Whyte (1992)
Effects of Vocabulary Programs on Reading Comprehension	Dole, Sloan, and Trathen (1995)
	McKeown, Beck, Omanson, & Perfetti (1983)
	Beck, Perfetti, & McKeown (1982)
	Reinking & Rickman (1990)
	Wixson (1986)
Derivation of word meaning from context	Gipe & Arnold (1979)
	Jenkins, Stein, & Wysocki (1984)
	Shu, Anderson, & Zhang (1995)
	Konopak (1988)
Effects of Specific Strategies on Vocabulary Acquisition	Levin, McCormick, Miller, Berry, & Pressley (1982)
	Schwatz & Raphael (1985)
Acquisition of Technical Vocabulary	Memory (1990)

The second categorization scheme focused on the way in which words were selected for instruction and the assessment tasks that were designed to measure vocabulary growth. To determine the basis for word selection and the assessment task(s) in the studies, we pursued an iterative process that is common in qualitative research (Bogdan & Biklen, 2003; Denzin & Lincoln, 2002). Each study was examined individually to determine the constructs being assessed. A study was reviewed by one of the principal researchers to identify criteria for word selection and the assessment task(s). A substantial list of approximately 40 different items was generated.

This list of 40 items was examined in relation to the five complex constructs that Nagy and Scott identified (incrementality, multidimensionality, polysemy, interrelatedness, and heterogeneity). The heterogeneity construct was deconstructed to include five items (conceptual complexity, abstractness, centrality of the word in understanding specific texts, frequency, and syntactic form). In some cases, specific items found in the archival studies did not correspond to the Nagy and Scott constructs. Based on Graves and Watts-Taffe's (2002) suggestions, the domain of *word consciousness* that included metacognitive knowledge and use of strategies was added.

An additional category representing simple understanding of word meaning was also added. The domain of simple aspects of recognition of word meaning includes *likely knownness of words* (Hiebert, 2005), *speed of retrieval*, *accuracy*, and *general vocabulary knowledge*. We then examined the constructs in greater depth, defining and operationalizing all of them. The final set of constructs that resulted from this iterative process appears in Table 2.

The vocabulary constructs listed in Table 2 were operationalized somewhat differently in the two research tasks (word selection and vocabulary assessment) that were examined in the archival studies. These differences can be explained, in part, by the nature of the tasks. Vocabulary assessment typically focuses on word recognition and may include measures of *automaticity*, *accuracy*, *breadth*, and *semantic decision-making*, constructs that are unlikely to be considered in word selection decisions. Conversely, word recognition may entail consideration of complex constructs such as multidimensionality, polysemy, and inter-relatedness, constructs that are not readily tapped in vocabulary assessment. With the exception of *prior knowledge*, the overlap between constructs associated with word selection and assessment tasks in the archival studies was not substantial.

Coding of the Studies

After the final list of criteria was agreed upon by the research team, one member of the research team who had been part of the initial cycle of identifying constructs within the studies and a second researcher who had not been part of the original conceptualization went through each of the studies to classify the word selection and, subsequently, the assessment tasks.

To apply the categorization scheme for word selection, we relied on the lists of words given in the articles. In some cases, it was necessary to locate additional studies that had used the words previously. In most cases, sample words were given along with selection criteria in the description of the study.

Each study was also analyzed to determine the nature of the means of assessing vocabulary knowledge. In both the analysis of word selection and of assessment task, the criterion for inclusion was lenient. In some cases, the presence of a construct in either word selection or assessment was clear-cut as when researchers used a pretest to identify the words for study (e.g., excluding words known by the majority of the sample). In other cases, the use of a construct for word selection or assessment was more tenuous as when researchers stated that the chosen words were considered to be unknown by most students at the given grade level. Even in the latter cases, the study would be coded for use of the construct, prior knowledge, in either word selection or assessment task design.

Two of the authors obtained an 85% interrater reliability for coding the constructs. A third researcher who was independent of the project also rated the constructs. The coding of the third researcher was used to establish a final rating when the two principal investigators disagreed.

Table 2. Vocabulary Constructs for Word Selection and Assessment Tasks and Their Presence in the Archival Research Studies

DOMAIN	CONSTRUCT	WORD SELECTION CRITERIA	% of Sample	ASSESSMENT	% of Sample
RECOGNITION OF WORD MEANING	PRIOR KNOWLEDGE	Likely knownness of word by age cohort	81	Likely knownness of word by age cohort	69
	AUTOMATICITY			Speed of retrieval of word knowledge	13
	ACCURACY			Accuracy in recognizing specific words (e.g., words in experimental condition versus a broader corpus)	100
	BREADTH			General vocabulary knowledge (e.g., a standardized vocabulary measure)	13
	SEMANTIC DECISION			Semantic decision or appropriate use of word(s)	50
COMPLEX UNDERSTANDINGS (Nagy & Scott, 2000)	INCREMENTALITY	Levels of word knowledge (e.g., partial knowledge; deep knowledge)	6	Levels of word knowledge (e.g., partial knowledge; deep knowledge)	44
	MULTIDIMENSIONALITY	Knowing a word includes such things as collocation or use in formal or informal settings	6	Knowing a word includes such things as collocation or use in formal or informal settings	13
	POLYSEMY	Multiple word meanings	6	Multiple word meanings	13
	INTERRELATEDNESS	Semantic members of a word's network	13		
		Morphological transparency	13	Transferability of morphological knowledge (e.g., *nation* to *national*)	13
	HETEROGENEITY	Conceptual complexity	44		
		Abstractness	6		
		Centrality of word(s) in understanding specific texts	44		

Table continued on next page.

Table 2. Continued

DOMAIN	CONSTRUCT	WORD SELECTION CRITERIA	% of Sample	ASSESSMENT	% of Sample
		Frequency	44		
		Syntactic form (i.e., nouns, verbs)	13	Syntactic form (i.e., nouns, verbs)	6
WORD CONSCIOUS-NESS				Metacognitive strategies or knowledge	6
				Use of strategies to derive word meanings (e.g., context or morphological clues)	38

RESULTS

Primary Focus

The instructional foci of the studies are summarized in Table 1. The archival studies were quite diverse in terms of the instructional foci, ranging from read aloud programs delivered to preschool children to technical vocabulary terminology taught to twelfth grade students in Science and Economics classes.

Constructs for Word Selection

Table 2 includes percentages of studies in which particular criteria were used for word selection. An examination of the archival studies revealed a great deal of similarity in terms of word selection criteria. In the majority of studies, researchers used existing texts as the source for identifying the words for inclusion in their examination of vocabulary learning. The construct that was most commonly used for selecting the words from the texts was the likelihood that words were unknown to the target students. In 81% of the studies, researchers described their conclusion, or that of teachers, that particular words "would likely be unknown to the subjects" (Konopak, 1988, p. 4).

With respect to the other nine constructs used to select words, three were used in a sizeable number of studies (44%): *conceptual complexity*, *centrality of words* in understanding specific texts, and *frequency*. All three of these constructs are ones that Nagy and Scott (2000) have described as demonstrating the heterogeneity of complex vocabulary. One other aspect of heterogeneity (syntactic features of words) and both aspects of interrelatedness (semantic and morphological features) were identified in two studies (13%). *Abstractness*, another aspect of heterogeneity, was described as a criterion for word selection in one study. Multiple dimensions of words and levels of word knowledge (incrementality) were all mentioned in only 6% of the research articles regarding the selection of words for study.

Thus, three aspects of a construct that Nagy and Scott (2000) have described as complex, *heterogeneity*, influenced researchers' selection of words in almost half of this sample of studies. Evidence for the use of the other constructs that comprise Nagy and Scott's (2000) complex understandings of vocabulary are sparse across the studies. Overall, words were not chosen for features of incrementality, multidimensionality, polysemy, or interrelatedness.

Constructs for Assessment

Most of the assessments used a multiple-choice format. With one exception, the underlying constructs that were represented in the multiple-choice format differed across studies as can be seen in the Assessment column of Table 2.

The one exception was the assessment of accurate recognition of a specific, rather than generalized, set of words. This assessment criterion was applied uniformly across studies. The assessment of the specific words that were taught would be expected. However, if generalization of students' knowledge about a particular aspect of vocabulary is a goal of vocabulary instruction, the ability of students to apply their knowledge to a set of untaught words that have similar features as the taught words is of interest. For example, in a study where words have been chosen to represent particular semantic networks, an assessment task could include similar but untaught words from the same semantic networks. This perspective was not taken in any of the studies.

Two other constructs were prominent in the design of assessment tasks in more than half of the studies, *likely knownness* and application of vocabulary knowledge in *semantic decision-making*. The pre-test for prior knowledge that had been administered in many studies made it possible to establish increases in knownness of words. The relative prominence of the semantic decision-making construct is understood in that an application of the vocabulary knowledge that students have gained is an underlying goal of vocabulary instruction.

Two additional constructs influenced the design of the assessment tasks in a sizeable portion of studies: *levels of word knowledge* (44% of the studies), one of the complex understandings of vocabulary identified by Nagy and Scott (2000); and *use of strategies* to derive word meanings (38%), a construct that taps into word consciousness.

The seven remaining constructs were represented either rarely (in 2 studies) or very rarely (1 study). These seven constructs were part of all three domains, simple constructs (speed of retrieval), complex understandings (multidimensionality, polysemy, and interrelatedness), and word consciousness (metacognitive awareness of word meanings and application).

Even though a sizeable number of studies, seven (44%), had indicated that word selection had been based on the complex constructs of conceptual complexity and centrality of vocabulary to understanding specific texts, these constructs were not represented in the assessment of tasks following the vocabulary intervention.

In conclusion, the assessment tasks in this sample of the archival literature tended to exemplify simple constructs of vocabulary. The only three constructs that were present in the majority of studies came from the domain that dealt with a "simple" view of word recognition. Only one of the complex constructs identified by Nagy and Scott (2000) as incrementality was evident in a sizeable portion of studies (44%). With respect to word consciousness, while assessment of strategy application was evident in a sizeable number of studies (38%), only one study attended directly to metacognitive knowledge of vocabulary.

DISCUSSION

There is a broad consensus among educators and policy makers that vocabulary is an essential component of literacy instruction (Baumann et al., 2003; Blachowicz & Fisher, 2000; NICHD, 2000). The purpose of these analyses was to ascertain the extent to which studies cited in recent syntheses of research on vocabulary instruction are consistent with current theories and knowledge about vocabulary acquisition, teaching, and learning. The results of this study indicate that the way words were chosen and the vocabulary assessment measures in some of the most respected experimental studies in the field did not take into account factors that we now realize could influence vocabulary acquisition. In this sample, there is a clear emphasis on whether or not students learned a specific set of words. However, other factors that have been found to make a difference in word learning received substantially less emphasis in both the selection of words and their assessment. This isn't surprising, given that many of the studies took place over twenty years ago.

Although the researchers may have thought about constructs discussed in the analysis, little evidence of such thinking is found in the articles reviewed. Elements such as the morphological patterns of the words, their syntactic form, whether or not they were abstract or concrete, or whether or not multiple meanings might exist were rarely mentioned in the articles regarding the words selected for the studies. The constructs that were manifested through assessment tasks were equally limited. Some of the studies considered constructs such as prior knowledge, the ability of a student to draw on vocabulary knowledge to make a semantic decision, the use of strategies to derive word meaning, and the incrementality of word knowledge. However, other important constructs were overlooked by nearly all of the researchers. Only one of the studies took into account whether the vocabulary knowledge would transfer to other words or the concept that words have multiple meanings. Only one study mentioned the students' metacognitive knowledge about strategies or words, multiple dimensions of words or factors involved with different syntactic forms. For the most part, evidence that researchers considered complex constructs was weak and implicit. The consideration of complex constructs was not central to the purpose of the archival studies nor did they appear to drive word selection or assessment decisions.

Given that these constructs have been identified as important aspects of word acquisition, generalizations based on archival studies such as these should be viewed with caution. A serious concern is the selection of words for this set of studies. Although some studies used word frequency indices in selecting appropriate words for instruction, the majority of the studies did not report conceptually or empirically based decisions regarding word choice, relying instead on researcher or teacher intuition. Researchers approached word selection from a practical perspective, selecting words that were found in grade level stories or textbooks. Consideration of complex vocabulary constructs, when it occurred at all, appeared to take place after text selection. The most important factor in word selection was neither a research-based construct nor a word frequency index. Most words in the archival studies were selected from the classroom textbook or reading anthology based on the fact that the words were probably unfamiliar to students. This raises an important policy issue regarding the role of textbook publishers in word selection and vocabulary instruction. There are many factors to consider when selecting the words that should be studied in a text. Surely such factors as the conceptual complexity of words, their morphological form and the frequency with which they occur in English deserve attention. In the archival research sampled in this study, they were not commonly used. This is problematic when we use such studies as the basis for contemporary instruction.

Finally, demographic considerations are an important factor in evaluating the relevance of the archival studies. Contemporary classrooms are often highly diverse in terms of student achievement, ethnicity, and socio-economic status. However, the subjects of the archival studies, were mostly average-to-above-average, middle class, English speaking students. Only two studies included subjects who were predominantly low-income and African American. None of the researchers reported the inclusion of English language learners, raising concerns when we try to generalize to this population of students. This is a particularly unfortunate omission due to the growing numbers of English learners in contemporary classrooms and the compelling need of these students for effective vocabulary instruction.

The significance of this study extends well beyond the current analysis. A unified set of constructs, widely accepted in the vocabulary research community, was applied as a common metric in the evaluation of vocabulary research. Not only does this set of constructs provide a solid framework for examining the archival studies, but it can also be applied to the conceptualization of vocabulary instruction and the design of future research. When researchers consider the incrementality, multidimensionality, polysemy, interrelatedness, and heterogeneity of words, they address the complexity of the word learning process. The instructional methods that researchers develop, based on these constructs, have the potential to increase teachers' awareness of complex vocabulary acquisition processes and positively influence classroom practice.

A limitation of this study is the sample selected for the analysis. The selection process ("third study criterion") eliminated studies that may have considered the constructs discussed in this paper. However, we believe that this sample is representative of the type of assessment and word selection found throughout the research. Future research is needed to examine the full range of constructs that have been addressed in archival vocabulary studies.

The National Reading Panel (NICHD, 2000) has called for more rigorous research on vocabulary instruction. As researchers gear up to study vocabulary instruction in depth, we think it is essential to look at the constructs that are being assessed by our measures of vocabulary and to develop construct-based vocabulary assessments that meet high standards of reliability and validity. It is also imperative to ask whether there are other important factors to consider in the experimental design of vocabulary research.

In summary, this analysis suggests that the archival studies provide an important but limited lens for viewing vocabulary research. The archival studies were situated in a historical context that has shifted with time and growth in knowledge. Future studies are needed that pay attention to the complexity of word learning and assessment based on the full range of constructs examined in this paper.

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APPENDIX A

Master List of Studies in the Sample

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